tion is in no way limited thereto. In an exemplary embodiment of the invention, a patch-sized fluid delivery device may be approximately 6.35 cm (~2.5 in) in length, approximately 3.8 cm (~1.5 in) in width, and approximately 1.9 cm (~0.75 in) in height, although, again, these dimensions are merely exemplary, and dimensions can vary widely for different embodiments.

[0521] While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

What is claimed is:

1. A device for dispensing fluid, the device comprising:

a housing;

a pump enclosed in the housing;

a dispensing assembly downstream of the pump, the dispensing assembly comprising a sensor for quantitatively measuring a parameter related to a volume of a dispensing chamber, wherein the pump ejects fluid in a manner so as to repeatedly deliver fluid from the dispensing chamber through an exit;

a control loop coupled to the sensor and the pump for controlling actuation of the pump based on the measured parameter; and

a controller for determining the cumulative volume of fluid delivered through the exit based on the measured parameter.

2. The device of claim **1** wherein the sensor further comprising an acoustic energy source for acoustically exciting gas in an acoustically contiguous region to produce an acoustic response therein.

3. The device of claim **2** wherein the sensor further comprising a first acoustic transducer mounted at a first position in the acoustically contiguous region for producing an electrical signal based on the acoustic response.

4. The device of claim **3** wherein the region comprising:

a subregion coupled to the dispensing chamber wherein a change in volume of the dispensing chamber causes a change in volume of the subregion; and

a processor.

5. The device of claim **4** further comprising wherein the processor is coupled to the first acoustic transducer and to a reference and implements a flow determination process for determining a quantity related to change of volume of the subregion based on the acoustic response.

6. The device of claim **5**, further comprising wherein the acoustic energy source excites the gas at a single frequency and the electrical signal produced by the first acoustic transducer has a phase relationship with respect to the reference, and wherein the flow determination process determines a quantity related to change of volume of the subregion based on temporal evolution of the phase relationship.

7. A device for dispensing fluid, the device comprising:

a housing;

a pump enclosed in the housing;

a dispensing assembly downstream of and in fluid communication with the pump, the dispensing assembly comprising a sensor for quantitatively measuring a parameter related to a volume of a resilient dispensing chamber, wherein the pump ejects fluid in a manner so as to expand the resilient dispensing chamber, the resilient dispensing chamber repeatedly delivering fluid through an exit;

a control loop coupled to the sensor and the pump for controlling actuation of the pump based on the measured parameter; and

an acoustic energy source for acoustically exciting gas in an acoustically contiguous region to produce an acoustic response therein, the region comprising:

a subregion coupled to the dispensing chamber wherein a change in volume of the dispensing chamber causes a change in volume of the subregion; and

a processor,

wherein the sensor further comprising a first acoustic transducer mounted at a first position in the acoustically contiguous region for producing an electrical signal based on the acoustic response, and

wherein the processor is coupled to the first acoustic transducer and to a reference and implements a flow determination process for determining a quantity related to change of volume of the subregion based on the acoustic response.

8. A device according to claim **7**, further comprising wherein the acoustic energy source excites the gas at a single frequency and the electrical signal produced by the first acoustic transducer has a phase relationship with respect to the reference, and wherein the flow determination process determines a quantity related to change of volume of the subregion based on temporal evolution of the phase relationship.

9. A device according to claim **7**, further comprising:

a finite fluid impedance coupled to the exit, the impedance being sufficient to permit expansion of the resilient dispensing chamber.

10. A device according to claim **9**, wherein the impedance comprising a passive impedance.

11. A device according to claim **9**, wherein the passive impedance comprising a conduit.

12. A device according to claim **11**, wherein the conduit comprising coiled tubing.

13. A device according to claim **11**, wherein the conduit comprising a serpentine shape.

14. A device according to claim **11**, wherein the conduit further comprising a length and an internal diameter selected to provide a predetermined impedance based on at least one of a viscosity and a density of the fluid.

15. A device according to claim **9**, wherein the dispensing chamber comprising an inlet, and the conduit comprises an internal diameter less than an internal diameter of the dispensing chamber inlet.

16. A device according to claim **7**, wherein the pump comprising:

a pumping chamber comprising:

an inlet in fluid communication with a fluid source; and

a pump outlet; and

a force application assembly adapted to provide a compressive stroke to the pumping chamber,

wherein the compressive stroke restricts retrograde flow of fluid from the pumping chamber through the inlet and urges fluid from the pumping chamber to the pump outlet.